

The Open Architecture Business Model

The Opportunity:

The rate of change and the availability of COTS technologies have driven the commercial market to a modular open systems approach at both the system level and at the multiple or system of systems level of capability delivery. This same environment is now driving platform based National Security Systems (NSS) acquisition efforts away from the traditional integrated MILSPEC process and toward Open Architecture Business Models which leverage the following.

- At the stand alone System or Sub-system level:
 - ‘Components’ are now stand alone multi-purpose processors, servers, advanced displays, and certified cabinets vice transistors or resistors. As a result hardware acquisition is a procurement, integration and packaging effort vice development and manufacturing effort.
 - Software development is uncoupled from hardware procurement, as software can be developed and run on COTS hardware. As a result, software transitions to ‘components’ or modules obtained from multiple sources via competitive selection processes.
- At the Warfare Systems of System level:
 - A network backbone [of some kind] serves as the information exchange medium and individual subsystems (or nodes) provide the sensor, command and control, external communications, weapons control or other specific operational capability or functionality.
 - As a result, the need for integrated solutions is superseded by the flexibility, operational capability and cost advantages associated with using federated business models in which modules are competed at the second and third tier of the work break down structure. This approach enhances specialization, widens the aperture for potential sources and enhances the opportunities for reuse

The end result at both the subsystem and the Warfare System of Systems levels is what Adam Smith in The Wealth of Nations called “division of labor” and today is sometimes referred to as competitive specialization. The environment provides new opportunities for non-Original Equipment Manufacturers (OEM) players (e.g. ONR, Small Businesses, Academia etc) to engage directly in the development and delivery process. Figures 1 and 2 provide very basic pictorial renderings of the OA Business model using the same basic picture to illustrate both the System and System of Systems levels.

Open Architecture Business Model:

The following OA Business Model started with the original OA Business Working Group Chaired by a representative from DASN ACQ. When assessed by the Industry Advisory Team, the non-military aspects of the model’s key principles were recognized as consistent with and common to the commercial market model for electronics systems. Key principles include:

- The use of Performance Specifications that define “what” is needed not “how” it is designed

- Subdivision of labor or specialization at the module or component level,
- Defining and segregating roles and responsibilities for component delivery, system integration and life cycle support,
- The criticality of a feedback process to create a “spiral” or “build test build” process

The OA Business models shown below describe the basic business model for military acquisition programs that fully embrace the advantages and opportunities enabled by COTS Technologies.

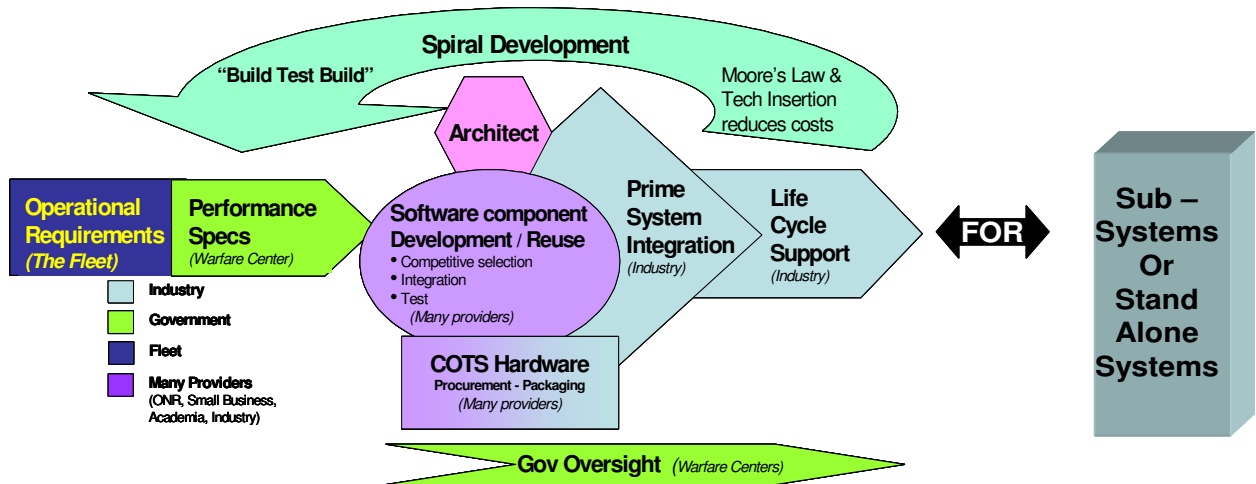


Figure 1 for Individual Systems or Sub Systems

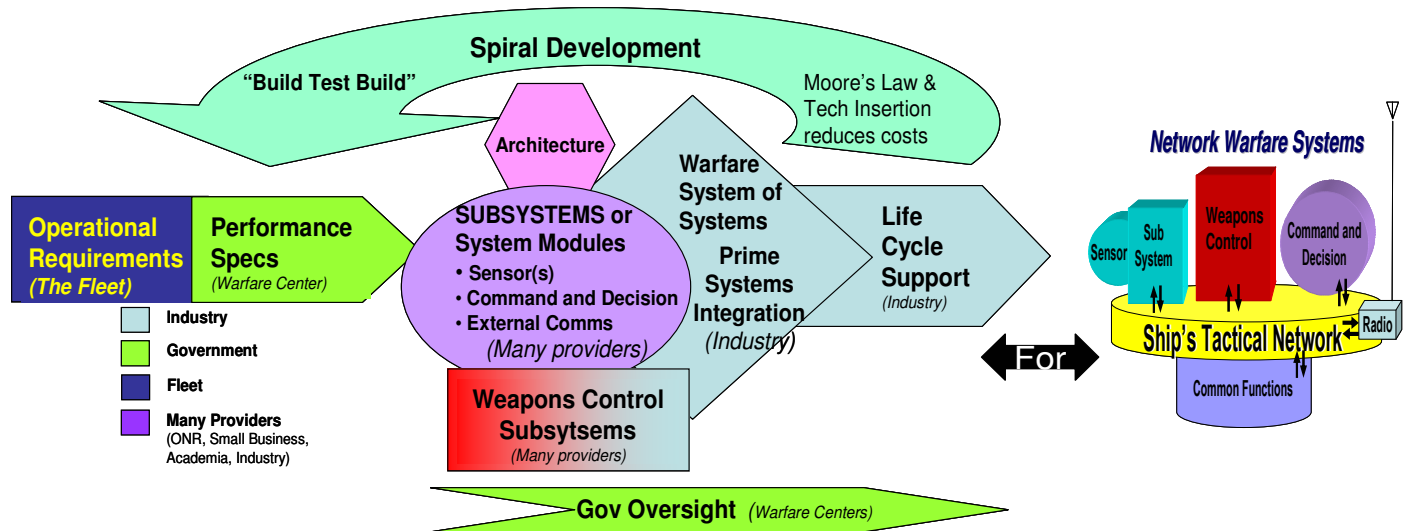


Figure 2 for Warfare Systems of Systems

Figures 1 and 2 illustrate the Open Architecture Business Model as follows:

- Operational Requirements: The Fleet and OPNAV define Operational Requirements and are continuously engaged at each stage in the acquisition process providing:
 - Consolidated requirements to the acquisition community so that funding is focused on priorities instead of being distributed across parallel efforts.
 - Support in performance specifications development.
 - Engagement with the design process to optimize the Human Systems Interface
 - Direct involvement with logistics, training, and other life cycle support issues
- Performance Specifications: The government develops performance specifications instead of detailed technical specifications. Performance specifications are more detailed than operational requirements but they only specify “what” capability is needed and do not cross the line into “how” that capability should be provided. This reduces the load on the government and enables the vendor to use his COTS “how to” technical expertise.
- COTS Hardware: Hardware procurement and packaging emphasizes using COTS technologies in warfare systems standards generally accepted in the commercial market. Unique proprietary COTS technologies that may be needed for specialized requirements but limit reuse or acquisition flexibility are minimized. Market surveys and competition for components can be conducted by the government, system vendors, or system integrators.
- Software Development: Software development segregation from COTS Hardware procurement and platform environmental packaging is the best example of the division of labor and the acquisition options characteristically enabled by COTS and the OA Business Model. Key steps in successful software development processes leveraging multiple sources include, market surveys, product selection, software integration and testing.
- Prime System Integrator: The prime system integrator pulls all the components, including software together and integrates them into a deliverable system. The prime system integrator is in most cases also responsible for system training, supportability, and logistics.
- Life Cycle Support: Life Cycle support when provided by the prime system integrator, or other industry representative in a spiral development process, provides numerous advantages:
 - Enabling intrinsic profit performance incentives to drive maximizing supportability, survivability and maintainability as system design parameters
 - Corrective, preventative, and upgrade maintenance can be combined into a coordinated effort that provides direct labor to the Prime Contractor and reduces the ship’s in-port maintenance.
 - Combining these characteristics provides fiscal incentive for the prime system integrator to support the OA Business Model.
- Spiral Development: Modular design and division of tasking across the second and third tiers of the work break down structure enables ‘Spiral’, ‘Build-Test-Build’, and incremental development by precluding the need to develop “new” systems. Operational capability in COTS open systems can be upgraded on an annual or bi-annual basis with software “builds” and hardware technical refresh or insertion can keep pace with COTS technology changes.

The Benefits:

From an operational perspective, breaking the link between software development and hardware procurement and then dividing the labor among different subsystem suppliers in a federated business model approach maximizes flexibility, best of breed competition, component or module reuse and reduces enterprise costs in logistics, training, watch stander qualifications and

unnecessary redundancies. Programmatic flexibility is maximized because individual programs acquire open system COTS computing environments or platforms that meet their individual needs and are within their budgets while still providing the common operational capability via the common software.

This process has already been successfully applied to individual sensor systems, and federated warfare systems of systems which combine sensing, command and decision and weapons control subsystems. The principal lesson learned from implementing the OA Business Model is that costs go down significantly (i.e. measured in substantial factors vice fractions, for example the total development and production costs of one systems were about one fifth the costs for the same deliverables in a previous system with the less capability).

OAAT and the OA Business Model

The OAAT and OAAM are designed to be used by the Program Manager, the PEO, and the MDA as the key elements of the Acquisition Chain of Command. It should be used as needed by the Acquisition Chain of Command and prior to Milestone Reviews. The OAAT provides examples and possible options that can be leveraged at all stages of the acquisition process from program planning to justification and defense in the PPBS/POM process. When used in conjunction with a Team from the OAET the Acquisition Chain of Command benefits from the independent assessment of a program which includes suggested options drawn from previously collected lessons learned and reusable. In parallel the OAET Team benefits by collecting lessons learned and reusable from the programs reviewed.

The business questions in the OAAT use the OA Business Model as the target end state of the framework within which acquisition processes operate. OAAT Business questions identify and measure key enabling and defining attributes of the OA model to evaluate the degree of implementation. These questions have been customized for National Security Systems (NSS). Individual questions have been drawn from three primary sources; members of the DoD Open Systems Joint Task Force (OSJTF), past or present government Program Managers of NSS Programs, and inputs from Industry and Small Business representatives.

The OA Assessment Model (OAAM) and the OAAT are tools used by Program Managers and the OAET to help assess programs for openness and provide feedback to the Program Office and its chain of command. The OAAT process supports the OAET in its efforts to identify, collect, and distribute technical and business tools, modules – components, and OA or programmatic lessons learned that enhance the ability to achieve openness and cross domain reuse of components or leveraging lessons learned from other programs. The OAAM and the OAAT are independent of the technical criteria specified by OACE. The OAAM and the OAAT supplement the MOSA PART by assessing attributes or characteristics of a Program's business practices in more detail than MOSA PART for National Security System (NSS) acquisitions. In other words MOSA PART is formatted for all programs at all ACAT levels. Therefore, although a topic addressed by the MOSA PART may appear to be the same, OAAT questions are targeted to more detailed attributes associated with NSSs.

OAAT Process

Since every NSS program has its own unique drivers, limitations, and characteristics, it is very difficult to “picture” intermediate levels of OA Business maturity using generic pictures (e.g. what does Business level 2 look like?). In an effort to keep the assessment process both simple and fair a two step process is used to obtain the OA Business "grade number" (0 - 4) plotted on the OAAM. The basic process sequence of events is as follows:

1. OAAT questions are answered by the individual Program Office or organization.
2. OAAT calculates a linear score based on the responses to the questions.
3. OAAT results are then adjudicated using the OAET review process. Issues, questions, and unique characteristics of the program are resolved with the Program.

Using this process:

- The Program benefits from the lessons learned and feedback from the OAET team on those areas where it is assessed that the program could improve the system or the Programs “Openness”
- The unique characteristics of the Program are factored into the OA Business Score to ensure fairness.